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FORWARD STUDIES UNIT

Some Unpleasant Arithmetics of Regional Unemployment in the EU. Are there any lessons for EMU?

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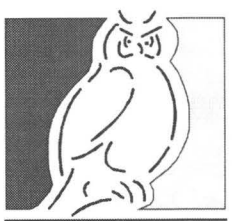
Working paper, 1999



Forward Studies Unit

Working Paper

Contents

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Lucio R. Pench, Paolo Sestito and Elisabetta Frontini*

Summary

Several studies have documented the weak response of regional wage differentials and labour mobility following region-specific ("idiosyncratic") shocks in the average of the EU countries. This has been often taken as evidence of the rigidity of labour markets in European countries, as opposed to the flexibility of the USA. However, as such shocks by definition average to zero, one cannot make an explicit link between the (lack of) adjustment at regional level and aggregate unemployment. Moreover, the emphasis on the reaction to short-run idiosyncratic shocks is unlikely to explain the permanent differentials across regions, which characterise the regional distribution of unemployment in many EU countries. This paper tries to provide a better understanding of the regional distribution of unemployment and why region-specific shocks can matter for aggregate unemployment. It does so by explicitly considering the possibility of asymmetric reactions, so that unemployment rises more in poorer areas suffering an adverse shock than it declines in richer regions experiencing a favourable shock. The reason behind such asymmetries is the presence of a wage floor in the poorer regions resulting from policy centralisation, as for instance in the case of a national unemployment compensation system, which provides benefits that are uniform across regions. If such a mechanism is at work, aggregate unemployment tends to be "inflated" by region-specific shocks that are inequality-increasing. After presenting an illustrative model of the mechanism, the paper proposes a simple measure of the resulting "excess unemployment", based on the difference between the average (national) unemployment rate and the unemployment rate of the median region. It also examines the relationship between regional asymmetries in unemployment and the dispersion of productivity across regions, taken as proxy of the inequality-increasing shocks. The evidence, while not entirely conclusive, justifies two tentative policy conclusions, which are particularly relevant in the context of EMU: a) to avoid centralisation of labour market institutions at the EU level that may end up inflating aggregate unemployment; b) to effectively deploy regional policies to combat inequality- increasing shocks.

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Introduction

Europe is often characterised as a high-unemployment area in contrast with the full-employment economy of the United States. This is a partial picture. It is well known that EU countries differ substantially in terms of labour market performance. These differences are in turn correlated to different institutional features, which are often linked with each other [1].

Also well known, but less studied in connection with overall employment performance, is the fact that in several EU countries national rates of unemployment average out large regional differences. A re-examination of these regional differences, and their role in explaining overall employment performance, is the focus of this paper.

Econometric analyses of regional unemployment tend to study the response of wages, employment and unemployment to idiosyncratic (i.e., region-specific) shocks. This allows gaining a better understanding of the mechanism leading to the persistence of unemployment in many European countries. However, as idiosyncratic shocks are assumed to average out to zero, these analyses do not add to our knowledge of the regional determinants of the long-term or "natural" rate of unemployment at aggregate level. One fact in particular calls for a different approach: regional rankings in the national unemployment leagues tend to be stable over time. This points to differences in the underlying determinants of the natural rate at regional level. In turn, these differences cannot be solely reduced to those institutional features (for example, labour market regulations, bargaining structure) that are usually considered when explaining different unemployment outcomes across countries. This is because such institutional features tend to be fixed at national level and hence to be the same across regions.

This paper explores the possibility of a direct link between regional disparities and the aggregate rate of unemployment. Such a link depends on the existence of non-linearities and/or asymmetries in the response to shocks. We suggest that "excessively" homogeneous labour market institutions may be responsible for non-linearities in the response of employment to labour demand shocks, as they tend to create nation-wide wage floors, which are binding for the less productive regions. Therefore, the larger the productivity differentials across regions, the more likely that the aggregate rate of unemployment will be "inflated" by high unemployment in the poorer regions.

The paper presents a systematic analysis of the regional dimension of unemployment in the EU. To this end we selected the most detailed level of disaggregation available for each EU country (NUTS3), so that regional differences can be observed also in the smaller countries (Luxembourg is not included). In the first section we provide some stylised facts on regional unemployment. It will be shown that many EU countries are characterised by large and persistent regional differentials. Moreover, the regional factor turns out to be a significant determinant of unemployment dispersion also in relation to other traditional cuts (by sex, age etc.). The second section briefly reviews the literature on European unemployment and the regions. This literature tends to focus on the (lack of) short-term reactions to region-specific demand shocks that are assumed to have no effect in the aggregate (that is, the increases in unemployment occurring in the regions hit by adverse shocks are offset by definition by the reductions occurring in the regions experiencing favourable shocks). In so doing, this literature may fail to explain why in most countries high-unemployment regions tend to be the same over time. It may also fail to capture the aggregate effects of the wage rigidities described at the regional level. The third section presents a simple model in which region-specific shocks do have effects in the aggregate. It also suggests a few features of the regional distribution of unemployment

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1 Different institutional features can be viewed as a direct cause of differences in the equilibrium rate of unemployment (see, for instance, Nickell, 1997). Alternatively, they can be seen as the source of quasi-hysteresis phenomena, in which, following the same type of shock, the unemployment rate drifts upwards in some countries, but not in others, depending on the institutional set-up (see, for instance, Blanchard, 1998). For a summary of the main explanations of European unemployment and a review of some institutional features see Buti, Pench and Sestito (1998), which also contains a sketch of some of the ideas developed in this paper.

and productivity that may be relevant for empirical analysis. These empirical features – specifically, an indicator of asymmetry in the distribution of unemployment and various measures of correlation between productivity and unemployment – are examined in the fourth section. A final section provides some policy conclusions. It presents some reflections on the implications of these regional problems for EMU and the policies required to deal with them.

1. The regional dimension of unemployment in the EU

In order to carry out our analysis we considered the NUTS3 level of regional disaggregation. This represents a departure from the prevailing empirical literature, which usually considers data at a more aggregate level, thus leaving aside small countries for which such level of aggregation does not apply. The details of the regional breakdown are spelled out in the Appendix. The number of regions included in each country varies from about 10 for the smaller countries to 30-40 for the larger countries. In total there are 232 regions. The period considered ranges from the early '80s (1983) to the mid-90s (1996) so as to cover more than one cycle, with a number of limitations due to the availability of data for some countries.

A preliminary examination of the regional unemployment data concerns three aspects: the extent of the differentials in unemployment within each country over time; the degree of regional persistence of unemployment; the importance of regional differentials in explaining the overall dispersion of unemployment. The main facts can be summarised as follows.

Regional differentials in unemployment are large in most European countries, with some countries exhibiting a tendency toward increasing regional divergence.
Graph 1 provides a summary of the evolution of regional differentials in unemployment since the 1980s. It compares, for each country and for each year, the average unemployment rate in: the high-unemployment regions (top quartile of the unemployment distribution), the low-unemployment regions (bottom quartile of the unemployment distribution), and the remaining central regions in the unemployment distribution (second and third quartile)[2]. The difference between the two extremes can be large. In 1996 it ranged from one and a half percentage points (the Netherlands) to seventeen percentage points (Italy), with ten countries out of thirteen[3] presenting a gap of around four percentage points or more. Over time, regional differentials tend to increase in line with unemployment in several countries, suggesting an important role for aggregate factors, both cyclical and structural. Such factors need not differ across regions to result in a widening of unemployment differentials: if shocks that are neutral across regions result in equiproportional changes in unemployment, the absolute change in the high-unemployment regions will be correspondingly higher. However, three countries stand out as region-specific factors seem to dominate aggregate ones: Italy, Belgium and (post-reunification) Germany. The Netherlands, by contrast, offers the example of a sustained reduction of regional differentials.

Regional unemployment is persistent in Europe in comparison with the USA.
Irrespective of the degree of regional dispersion, in all the major European economies the regions with relatively higher (or lower) levels of unemployment tend to be the same over time. This is shown by the simple correlations between the values of regional unemployment in a given year and the corresponding values for preceding years, which are high and only very slowly declining over time. (Graph 2 and Table 1). These data can be read as supporting the well-known thesis of persistence, that is, regional shocks in Europe tend to have permanent consequences on the employment and the unemployment rate because of labour market rigidities. By contrast, the significantly declining autocorrelation of regional unemployment over time in the USA fits with the characterisation of the American labour market as a model of flexibility. Leaving the discussion of the literature on regional unemployment in Europe and the USA to the next section, here we want simply to underline that persistence implies that a region's position in the unemployment distribution may change permanently as a result of a shock. The fact that the high-unemployment regions tend to be the same over time may well point to differences across regions in the underlying determinants of long-term unemployment.

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2 Note that the regions in each group are not necessarily the same from one year to another, as the group composition for each year is decided by the position of regions in the unemployment distribution for that year.

3 Austria was not considered in this comparison as the data on regional unemployment cover only a few years.

Regional factors account for a significant part the overall variation in unemployment

Unemployment can be decomposed along an array of relevant dimensions: duration, skill, age, sex, etc. These dimensions are variously emphasised by the different strands of the literature seeking to explain European unemployment. For example, duration is emphasised by the explanations that point to the disenfranchisement of the long-term unemployed from the labour market; skills are key in the explanations based on skill-biased technical progress and the rigidity of wage differentials. It is therefore important to take into account these dimensions when assessing the role of the regional dimension. However, the limitations of our regional data set allow considering only the effect of the regional dimension as distinguished from the age and sex dimension[4]. Table 2 presents the results of a variance decomposition exercise aiming at testing the explanatory power of the regional dimension once account is taken of the other dimensions[5]. It appears that in a number of countries the regional variable is an independently important factor in explaining the dispersion in unemployment that one finds across ages, sexes, years and regions. Standard analysis of variance suggests that the regional factor has an important explanatory power for Germany, the United Kingdom, Austria, Denmark, Belgium and Italy. The results for Germany, Belgium and Italy support the conclusion that in these countries unemployment is significantly a regional problem (surprisingly, the regional factor seems to explain a significant part of the dispersion in unemployment also in West Germany). In the case of Austria, Denmark and the United Kingdom, the economic relevance of the result is diminished by the small differences that can be detected in the regional effect across regions[6].

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4 Our regional data sources do not provide information on duration of unemployment and on the skill characteristics of the unemployed. Moreover, the age breakdown distinguishes only between the young (less than 25 years of age) and the adults (25 years of age and older).

5 Specifically, for each country, we regressed the (log of the) unemployment rates by region, age, sex and year against the corresponding set of regional, age, sex and year dummies. The time variable was added to capture aggregate (cyclical or structural) effects. The output (shown in Table 2) includes the (share of) variance explained by the regression (adjusted R^2), the marginal contribution of the regional dummies to the explained variance (measured by the increase in the adjusted R^2 following the introduction of the regional dummies in the regression containing the other dummies) and a measure of the variability (standard deviation) of the regional coefficients estimated by the regression.

6 The result is even less significant for Austria and Denmark, as the smaller size of the sample (due to the lower number of regions and, in the case of Austria, years available) reduces the precision of the estimated regional coefficients.

2. What can we explain on the basis of the existing literature?

While being relatively unknown in such detail, the stylised facts presented so far correspond to the standard view of the EU unemployment problem. In particular, it is common to consider the persistence of regional unemployment differentials over time as just a specific instance of the more general fact that unemployment is persistent in Europe compared to the USA.

The standard analysis in this area compares the adjustment to region–specific shocks in the EU regions to that in the States of the USA[7]. The main finding is that, while there are some differences in the adjustment mechanism on the wage side – with wages being relatively more rigid in Europe - the key difference appears to be on the labour supply side. In the case of the USA the adjustment to labour-demand shocks takes place mainly via migration flows, while in the EU case the response of labour supply occurs mainly via changes in the participation rate. As a consequence, in both cases employment levels change permanently after a shock to labour demand. However, in the case of the USA, because of the offsetting change in population, both the unemployment rate and the employment rate (i.e., the employed as a ratio to working age population) return to the baseline. By contrast, in the EU countries, as the population remains constant, the employment rate changes permanently (with some persistence also for the unemployment rate[8]).

This characterisation of the adjustment to regional shocks has played an important role in the debate on EMU. The lack of mobility in EU labour markets - while being a constraint on adjustment also in a national setting - is seen as a problem for the smooth functioning of EMU in the face of country-specific shocks.

Without entering the debate on adjustment under EMU we wish to underline that this standard analysis has almost no implications for the aggregate (national) level of unemployment. This is because the region-specific shocks by definition average out to zero at the aggregate (national) level: following such shocks employment rises in the regions affected by positive shocks as much as it declines in the regions hit by negative shocks, unemployment dispersion across the whole area increases but the total level of unemployment remains the same. The nature of the adjustment mechanism, whether migration flows or change in the participation rate, does not alter the result.[9]

It can be argued that the finding that wages response to a region-specific shock is less pronounced in Europe than in the USA is relevant for the understanding of high and persistent unemployment in Europe relative to the USA, at least to the extent that rigidity at regional level translates into wage rigidity at more aggregate level. One of the original reasons for examining the wage determination process at the regional level was precisely to validate conclusions at aggregate level[10]. However, while it is likely that some of the underlying reasons for wage rigidity at regional level will be producing the same result at aggregate level, between the two concepts there is not a perfect match. Rigidity at aggregate level tends to be lower than that at regional level to the extent that an aggregate negative shock lowers the workers' outside opportunities everywhere,

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7 The standard references are Blanchard and Katz (1992) for the case of the USA and Decressin and Fatas (1995) for the EU case. The methodology of these analyses relies on a three-dimension structural Vector Autoregression (sVAR),the three variables being employment, unemployment and wages (or, alternatively, the participation rate) expressed as ratio of their national counterparts (in order to net out from the common effects of nation-wide shocks). The underlying shocks to labour demand are identified from the model by assuming that they solely enter directly the employment regression.

8 Permanent effects on employment and unemployment are especially evident in Italy and Spain, as wages are particularly inflexible and the migration response negligible. The case of Spain is analysed by Jimeno and Bentolilla (1998) and Mauro and Spilimbergo (1998).

9 To be more precise, an indirect link between geographical mobility and overall employment exists to the extent that greater mobility is conducive to a better matching process in the labour market The resulting efficiency gains, however, have to be offset against the costs of mobility itself.

10 A spur to this literature was provided by Blanchflower and Oswald (1994). It purported to produce an estimate of the elasticity of wages to the local unemployment rate robust to changes in country and time (the estimated value was .10). Other papers focusing on single countries have however resulted in more differentiated values. In particular, it has been confirmed a lower responsiveness of wages for countries like Spain (see the discussion in Jimeno and Bentolilla, 1998) and Italy (see Casavola et al., 1995).

which is not the case with region-specific shocks. Moreover, in drawing aggregate implications from the slightly weaker wages response to region-specific shocks in Europe compared with the USA, one has to bear in mind that the centralised bargaining system prevailing in several European countries[11] may be better apt to react to country-wide shocks than to localised ones. This further sets apart the effects of region-specific shocks from those of aggregate shocks.

If the standard analysis at regional level does not allow firm conclusions about the determinants of unemployment at aggregate level a widespread perception remains nevertheless that, at least in some countries, the unemployment problem *is* a regional problem. We suggest that the focus of the standard analysis upon the reaction of wages and unemployment to temporary shocks, while technically appropriate for the identification of region-specific shocks, tends to miss the most relevant aspect of the regional aspect of EU unemployment. The stability over time of regional unemployment differentials suggests that they should be viewed as (long run) "equilibrium" phenomena.

Regional factors can readily explain regional and overall employment performance if one postulates that the employment (and unemployment) response to positive and negative shocks is asymmetric across regions. In other words, if the same shock raises employment by less in the regions where the shock is positive than it reduces employment in the regions where the shock is negative, then a given distribution of regional shocks may have implications at the aggregate level.

How can such an asymmetric response arise? In the following section we present a very simple model characterised by the presence of a country-wide wage floor, which is irrelevant for wages and employment in the high-wage, high productivity regions, but is "binding" in the low-wage, low-productivity regions. It is easy to show that, in such a case, regional shocks which are inequality increasing (i.e. negative in low-productivity regions and positive in high-productivity regions) tend to increase aggregate unemployment. Moreover, the existence of a common wage floor explains why in "equilibrium" the low-productivity regions have higher unemployment rates than the high-productivity regions.

Irrespective of the specific features of the model, the argument at its most general is one about downward wage stickiness. As such, it bears a resemblance to a rather ancient strand of literature, which highlighted the possible implications at aggregate level of the dispersion of unemployment across regions and markets. In this literature, the dispersion of unemployment was linked to the overall wage pressure and hence to the overall "natural" rate of unemployment through the non-linearity of the Phillips curve, as the upward wage pressure exerted by low-unemployment regions is not offset by the downward pressure from high-unemployment regions[12]. A further similarity with our reasoning may be found in the more recent literature on the implications of skill-biased technical progress for unemployment: if the wage curve is non linear and meets the demand curve in its "flat" section for the unskilled workers, a negative shift in demand for unskilled labour workers will not be compensated, in terms of aggregate unemployment, by a specular positive shift in the demand for the skilled workers[13].

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11 Particularly into those countries where the centralisation of bargaining is part of a "corporatist" structure.

12 See for instance Lipsey (1960) and Archibald (1969). The link between cross-market mismatch and the NAIRU via a strongly non-linear wage curve was recently reconsidered in Jackman, Layard and Nickell (1991). In the case of Italy Bodo and Sestito (1991) and Brunello et al. (1998) highlight a slightly different mechanism, in which the high-unemployment regions do not exert downward pressure on wages, as the bargaining outcome in the low-unemployment regions only counts for wage determination (wage leadership).

13 For a summary of this debate see Nickell and Bell (1995).

3. An illustrative model

The purpose of the following model is to show how a country-wide wage floor may work to produce an equilibrium in which unemployment is permanently higher in the low-productivity regions. Such a common wage floor has a further potential to increase unemployment: a shock that increases the dispersion of productivity across regions results in a rise in both the dispersion *and* the average of unemployment.

The existence of a common wage floor is derived in the model from the country's unemployment compensation system, in which the benefits are standardised to the wage prevailing in the median region. While this characterisation may correspond to the high degree of uniformity in benefits levels that is found in most countries[14], it is made here only for expository convenience. What really matters is that a common wage floor is in place, whatever the mechanism behind it. One might easily think of alternative mechanisms, such as a national minimum wage, or nation-wide union pay rates. It is also plausible to suppose that, within a country, "fairness" considerations effectively put a limit to the extent of regional wage differentials.

To keep the model simple, there are no links across regions in both demand and supply of labour. In particular, the model does not allow for migration. Essentially, allowing for a migration response to the differentials in wage and/or unemployment across regions would mitigate the main result of the model, that is, "high" ("low") unemployment in the low- (high-) productivity regions. The outflow of workers from the low-productivity regions would further sustain wages, reducing at the same time the unemployment rate, while the corresponding inflow in the high-productivity regions would ease wage pressures, as additional workers become available at the going wage rate. In other words, the model loses relevance if emerging wage and unemployment differentials elicit compensating movements in the workforce. This may provide a reading of the structural differences in regional unemployment between the USA and most EU countries.

Our model is based on a variant of the standard efficiency-wage model, in which at any level of activity the equilibrium wage is sufficiently high to result in the level of unemployment that is necessary to minimise unit labour cost including the cost of shirking. More precisely, we use the Shapiro-Stiglitz (1984) formulation. In this model (see the original source for the relevant passages) the wage-determination curve in region i is specified as:

$$wi = e + ci + r(e/q) + (s/(1-ni))(e/q)$$

Where:

w_i: wage in region i

e: effort

c_i: opportunity cost of work in region i

r: interest rate

q: probability of losing job when shirking

s: probability of losing job when not shirking

$(1-n_i)$: unemployment rate in region i

14 While unemployment benefits tend to be indexed to the previous earnings, and therefore to be related to local wages, nation-wide floors and ceilings frequently apply, which make benefits relatively uniform across regions of the same country.

In turn, labour demand depends on the level of productivity and wages. In its most general form:

$$ni = n(wi, xi)$$

Where:

n_i: employment (as percentage of labour force) in region i

x_i: productivity in region i.

The unemployment/wage equilibrium in each region is found at the intersection between the wage-determination curve and the labour demand curve.

Note that, for the sake of simplicity, it is assumed that the "shirking technology" is the same, that is, the probability of being fired if shirking and the required amount of effort do not differ across regions. Likewise, there are no differences in the probability of losing the job when not shirking. In other words, the equilibrium values of wage and unemployment differ across regions exclusively because of differences in: i) the opportunity cost of working (see below) and ii) the underlying level of productivity.

The assumption of a centralised unemployment compensation system comes into play when determining the opportunity cost of work. Specifically, the opportunity cost of work is defined as the maximum between two terms: the centrally determined benefit, a locally determined alternative income. The latter in turn is a (concave) function of productivity and unemployment. Formally:

$$c_i = \max\{ t(x_i, u_i), b_{wm}\}$$

with:

$\partial t/\partial x > 0$

$\partial t/\partial u < 0 \Rightarrow \partial t/\partial n > 0$

where:

b_{wm}: benefit indexed on the median-wage region

The definition of the opportunity cost of work implies that the centrally determined benefit is relevant for wage determination only in those regions and at those activity levels where productivity and/or employment are sufficiently low to make the benefit the highest possible equivalent income available when out of work. Looking at the specification of the wage-determination curve, one can see that the curve is upward sloping in the wage-employment space, on account of both the $(s/(1-n_i))*(e/q)$ and the $t(n_i)$ terms. If, however, the $t(n_i)$ term is replaced by the b_{wm} term, that is, the centrally determined benefit represents the opportunity cost of work, the wage-determination curve will be initially relatively flat, as n_i is small and b_{wm} is a constant.

Between regions, the presence of a flat section in the wage curve depends on the value of the centrally determined benefit relative to the local level of productivity. At one extreme, if productivity is very high relative to the benefit, even at low values of employment the benefit will not influence the wage curve. If, on the contrary, the benefit is generous in relation to productivity, the wage curve will be relatively flat over a wide range of employment values. The labour demand curve in turn shifts upwards and downwards with the level of productivity. Therefore, the intersection of the two curves is more likely to fall in the flat section of the wage curve, the lower the productivity level.

By the same logic, a negative productivity shock, by extending the portion of the wage curve that is relatively flat and by shifting downwards the labour demand curve, will increase the likelihood that the equilibrium falls in the flat section of the wage curve.

A three-region graphical model can illustrate the effects on aggregate unemployment when the equilibrium in one region shifts to the flat section of the wage curve. Let the subscripts h, m, l denote the high-productivity, median productivity and low-productivity region, respectively. The situation prior to the introduction of the centralised unemployment compensation is shown in Diagram 1, which has been drawn to generate the same unemployment rate in each region. In other words it is assumed that the productivity differentials are fully reflected by wages, with no effect on equilibrium unemployment (this being a rather standard characterisation of most natural rate models). Diagram 2 shows the effects of the introduction of unemployment compensation. It is supposed that unemployment compensation is calibrated so that the benefit level does not influence the wage curve of the median region at its intersection with the labour demand curve. The equilibrium remains unchanged, *a fortiori*, in the high-productivity region, where the benefit level is never binding. However, the equilibrium shifts in the low-productivity region, as the benefit level introduces a wage floor. As unemployment rises in the low-productivity region and remains constant in the other regions, both the national average and the regional dispersion of unemployment rise. Moreover, a negative correlation is created between regional unemployment and productivity, as the impact on unemployment is concentrated in the low-productivity region[15].

Building on the situation described in Diagram 2, Diagram 3 illustrates the case of an inequality-increasing asymmetric shock to productivity, that is, the high-productivity (low-productivity) region experiencing a positive (negative) shock[16]. Employment and wages rise in the high-productivity regions and fall in the low-productivity regions. However, as the equilibrium falls in the flat section of the curve in the low-productivity region, most of the effect there occurs in terms of employment, with only a minimum impact on the wage level. As a result, there is a further increase in both the national average and the regional dispersion of unemployment and the negative correlation between regional unemployment and productivity is reinforced.

In summing up the results of our model, we find two simple implications that should be amenable to empirical verification.

In any given country, (long-term) productivity and unemployment are negatively correlated across regions. Therefore, the higher the dispersion of regional productivity, the higher is the dispersion of regional unemployment. Moreover the mechanism at work is asymmetric, as the (negative) effect on employment is concentrated in the low-productivity regions, with little if any change in the high-productivity regions. In other terms, *a high dispersion of regional productivity goes hand in hand with a skewed distribution of regional unemployment.*

A key factor behind these results is the presence of a common wage floor, which in turn is the effect of a centralised unemployment compensation system[17] or other centralising labour market institutions. In the European context, in particular, centralisation is supposed to exist, to a greater or lesser extent, in each country but not at the European level[18], which explains why the model should apply across regions and not across countries.

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15 Needless to say, because of the pro-cyclical behaviour of productivity, a short-term negative correlation between productivity and unemployment is a common feature of all models, where wages do not adjust immediately. The correlation discussed here is a long-run feature, which abstracts from cyclical fluctuations.

16 For simplicity, the median region does not suffer any shock and is disregarded. Moreover , the shocks in the high-productivity and low-productivity region are assumed to be of the same size, so that they cancel out in the aggregate.

17 In a rather standard way, an increase in benefit generosity relative to the wage of the median region, a rise in b_{wm}, would unambiguously results in higher aggregate unemployment, as unemployment raises at least in both the median and the low-productivity region (a standard result in this kind of models). However, the effects on unemployment dispersion and skewness are less clear-cut, as unemployment may rise even in the most favoured region, the size of the changes in each region depending also on the steepness of the demand curve at the initial equilibrium point.

18 The lack of centralisation at European level is a generally accepted stylised fact. An incipient exception is possibly represented by Belgium, where a 1996 law sets an upward limit to collective wage increases calculated on the average of the wage increase in the Netherlands, France and Germany.

Note also that, as indicated above, the presence of compensating migratory flows would undermine the results of the model, notably the expected negative correlation between regional unemployment and productivity[19].

The implications of the model should not be over-stretched, given the extremely simple level of analysis adopted. Nevertheless, they suggest some clear directions for an empirical investigation of the distribution of regional unemployment, and of its correlation, if any, with productivity. This is the subject of the next section.

19 An equilibrium with full mobility entails equalisation of expected wages across regions and hence positive correlation between regional unemployment and productivity, as higher wages simply compensate for a higher risk of being unemployed (Harris and Todaro, 1970).

4. An empirical investigation of the regional distribution of (un)employment

We revert to our initial data set with a view to providing some empirical corroboration to the conclusions of the model. As these conclusions apply to long-term equilibrium, data were preliminarily averaged across two multi-year periods, 1991-96 and 1983-90[20].

To test the implications of the model concerning the distribution of unemployment and productivity, the analysis concentrates on two simple parametric measures: the coefficient of variation as a measure of dispersion[21] and the difference between the average and the median unemployment rate[22]. We present the values for these parameters both for the more recent years and for the '80s. We then focus on the main implications of the model as presented in the previous section, to see how they fit with our empirical findings.

Our initial overview of regional unemployment highlighted that regional unemployment is widely dispersed in some countries. This is confirmed by the measure of dispersion presented in this section. More interestingly, the measure of skewness indicates that the distribution of some countries is skewed toward the high end, with few high unemployment regions pushing up the average (national) unemployment rate.

Our first important finding (Graph 3) therefore is that *regional asymmetries in unemployment 'inflate' the national unemployment rate in some countries.* . (Positive) skewness[23] is particularly pronounced in Italy, Spain, Belgium and (post-reunification) Germany. The calculation on a multi-year basis and the previous findings on autocorrelation tend to exclude that dispersion and asymmetries are simply the result of asymmetries in temporary shocks. Negative skewness, that is, the representative unemployment rate exceeding the average unemployment rate on account of few low-unemployment regions, is a much less evident phenomenon. Interestingly, on a multi-year basis, the United States present moderate dispersion of the unemployment rate across regions, and slightly negative skewness.

As a robustness check on the significance of this general finding, we considered a range of indicators of labour market performance. Considering the employment rate (more precisely we consider 1 minus the ratio of the employed to the working-age population) instead of the unemployment rate does not change significantly the relative position of countries (Graph 4). Countries showing high (low) skewness in terms of unemployment rate tend to show high (low) skewness in terms of employment rate. Germany and Belgium (and to a lesser extent Portugal) are exceptions to this pattern, as the build-up of unemployment in some regions is apparently not matched by particularly depressed rates of employment. In the case of Germany this could be explained by the historically high levels of employment associated with the planned economy in East Germany and the reluctance of dismissed workers (including many women) to leave the labour force.

Breaking down the population by sex or age does not alter significantly the relative position of countries, particularly concerning the high-skewness countries. Regional skewness seems to be associated more with male than female unemployment, the most notable exception being Germany (Graph 5).

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20 The time choice was dictated by the intention to cover approximately two different cycles and the lack of a full data set for longer (or more recent) periods (some countries are in fact missing from the 1983-90 data).

21 That is, the standard deviation of regional unemployment normalised by the national average. The calculation of the standard deviation is unweighted, that is, regions in each countries were treated as if they had the same labour force. This simplification was adopted after tentative calculations showed that weighting each region by the relative share of the labour force did not yield significantly different results.

22 The median unemployment rate is defined as the unemployment rate of the region containing the 50^{th} percentile of the labour force. The median rate is empirically very similar to the average unemployment rate of the two intermediate quartiles of the regional unemployment distribution already presented in section 2.

23 As positive skewness is by far more pronounced than the opposite tendency, the term skewness in the following will be used to indicate the average being higher than the median, unless otherwise specified.

This may depend on the higher propensity of unemployed men to stay in the labour force relative to women. In terms of age, regional skewness is considerably more pronounced among the young (less than 25 years old) in Italy and Belgium as well as in Portugal (Graph 6). This indicates that the build-up of unemployment in the depressed regions hits particularly those entering the labour force for the first time, without higher mobility on the part of the young acting as an offsetting tendency. In the other countries regional skewness is broadly similar across ages or actually higher for adults than for young people. In France, for example, regional skewness is completely attributable to the adults, as the young exhibit the opposite tendency.

A second interesting finding concerns the evolution of regional asymmetries over time.
Large regional asymmetries in unemployment have been rising since the '80s (with some exceptions). Compared with the '80s, regional skewness has risen in some countries and has remained stable or even declined in others. However, the problem of the countries that can be considered as suffering from an 'excess' of unemployment in some regions seems to have grown worse over time (Graph 7). In the case of Germany the obvious explanation is reunification. For Belgium, Spain and Italy in particular this suggests the occurrence of shocks increasing inequality across regions, which regional and labour market policies have not been able to offset (or may even have aggravated, by reinforcing wage floors). By contrast, the Netherlands seems to present the situation of a country where significant regional asymmetries in unemployment have been reabsorbed since the '80s, suggesting that development in the economy and policies have been conducive to a reduction of regional inequalities.

Comparing across time the indicator of regional dispersion gives broadly the same message: dispersion has increased in countries where it was already high (Graph 8). Spain is the only country showing high and increasing skewness but declining dispersion.

We now turn to the implications of the model concerning the relationship between the regional distributions of productivity and unemployment. It will be remembered from the discussion at the end of the previous section that these implications depend on the presence of centralising labour market institutions (resulting in wage floors) and on the absence of compensating migratory flows. While both conditions seem fairly plausible in the European context, they were not properly verified (see 'open issues' below) and therefore the following results cannot be taken as a full testing of the model. The results can be summarised as follows.

Regional asymmetries in unemployment are associated with productivity differentials within countries. The correlation between regional skewness of unemployment and regional dispersion in per-capita GDP is positive and (weakly) significant[24]. The relationship holds both for the '80s and the '90s (Graphs 9 and 10).

Unemployment is negatively correlated with productivity within (some) countries, but no correlation exists across countries. At regional level, a number of European countries present a negative correlation between unemployment and productivity (GDP per worker) (Table 3). The result holds for most countries if one excludes the regions that coincide with the capital. The exclusion can be justified if one considers the peculiar role of the capital, which are more likely to attract the more risk-prone individuals (looking for a better rewarding even if more risky career). Moreover, in the capital there is in general a large weight of the public sector, whose presence may impart an upward bias to the GDP measure and may further act to attract job seekers. The negative relationship is statistically significant, however, only for a few countries. At European level, by contrast, no correlation is found between unemployment and productivity across countries. This also corresponds to the expected result, as the negative correlation between employment and productivity is due to centralising institutions that supposedly operate within countries but not across countries.
The above findings offer some suggestive evidence in favour of the thesis that attributes the worsening of the unemployment situation in some countries to the existence of different regional economies coupled with centralised institutions. It also tend to back the intuition that the problem may have become more serious in recent times, as regional gaps have increased in a number of countries while convergence was generally occurring across countries in the EU. The analysis, however, has serious limitations, which leave a number of issues open. They are briefly discussed below.

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[24] The statistical inference is made difficult by the very small number of countries considered, particularly for the first period here examined.

As already indicated, there is no control for the degree of centralisation of labour market and other social institutions. A meaningful measure of centralisation remains elusive, especially if one wants to include not only bargaining institutions but also other characteristics such as those of the welfare state. The available indicators tend to suggest that European countries are all relatively centralised (Table 4). For example, the United Kingdom, which has the most decentralised bargaining structure, appears to operate a strongly centralised welfare system when taking account of the widespread use of means-tested minima set at national level. It was not possible, however, to establish any significant correlation between any such indicator of centralisation, or combination of them, and the characteristics of the regional distribution of unemployment.

Similarly, there is no control for the degree of geographical mobility. A problem is that the variable that should be considered is not actual mobility, which presumably reflects wage and unemployment differentials and hence is endogenously determined, but the underlying propensity to move. Introducing the percentage of owner occupied houses, as a proxy of the (non-) propensity to move[25] does not affect the relationship between the regional dispersion and skewness of unemployment and the regional productivity dispersion. The experiment, however, is not conclusive, since it may simply indicate that the variable here considered does not fully capture the propensity to move (otherwise it should have had an impact on unemployment dispersion).

Finally, a number of caveats concern the limitations of the data here used.

The country sample is restricted and the regional characteristics are not observed in homogeneous units. The EU focus of the study, dictated also by the availability of data, means that one deals with a relatively small number of countries, ranging from 14 to.... depending on the data and the period, often with relatively similar characteristics. Moreover, in spite of the care taken in defining the regions, their size remains markedly different both within and across countries.

Data limitations are particularly severe for data other than those on the labour force, in particular those on regional productivity[26]. In principle, one would need to measure the underlying productivity, that is, a measure of productivity that is independent from the endogenous determination of wages and (un)employment. Indicators that may serve as an independent instrument to measure the underlying productivity of a region (such as productive infrastructure endowment) are not consistently available at regional level. In practice, one has to deal with two measures of actual productivity, which are likely to be biased in opposite directions: the per capita GDP is algebraically lowered by unemployment, while the GDP per worker is boosted by the exclusion of least productive workers in the high unemployment regions.

Moreover, the fact that GDP data are not necessarily consistent with labour force data, which are the sole source of employment figures at regional level, suggests against a systematic use of GDP per worker calculated as the ratio of GDP to employment. For these reasons, we have chosen to consider the GDP per worker when looking at the correlation between unemployment and productivity of each region (so as to avoid the risk of ending up with an "algebrical" correlation) and the GDP per capita when considering the productivity dispersion for a whole country.

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25 The data here used have been derived from MacLellan et al. (1998), who make use of several different sources. The argument behind the use of such a variable as proxy of the propensity to move is that already stated by Oswald (1996). Some evidence, for the Italian case, on the link between such a variable and actual migration flows (controlling for income differentials) has been reported by Cannari et al. (1997).

26 Also for labour force data problems may derive from the fact that most low productivity regions tend to be (at least in some countries) agricultural regions, where the agricultural sector still hides under-utilised work resources (so reducing the amount of negative correlation between productivity and (measured) unemployment across the regions of a given country).

5. Some policy conclusions in the EMU context

This paper has not directly addressed the issues commonly associated with EMU. It is not difficult, however, to draw some policy conclusions that are relevant for EMU.
EMU implies that the same monetary policy applies in all the countries of the euro area. This will boost the integration of the financial and productive environments. The participating countries will therefore tend to resemble regions of a single economic entity.

These features have marked the debate on the costs and benefits of EMU. The benefits are reckoned to include the efficiency gains from further economic integration and increased monetary stability. The costs essentially depend on the losses from the elimination of the intra-euro exchange rates as adjustment mechanism in case of idiosyncratic (i.e., country-specific) shocks. Much of the EMU debate has therefore revolved around the importance of idiosyncratic national shocks (or idiosyncratic effects of common shocks) and the presence of other adjustment mechanisms. The standard analytical framework is that of the "optimal currency area", in which the relevant aspects are: a) the relative size of idiosyncratic and non-idiosyncratic shocks[27], b) the degree of flexibility of product and labour markets[28], c) the presence of other shock absorbers, related either to assets diversification or to fiscal transfers.

Concerning fiscal transfers an argument has often been made that the small weight of the European budget relative to national budgets – at present and in the foreseeable future - poses an obstacle to a smooth functioning of EMU.
A better institutional design, so as to strengthen fiscal policy co-ordination across Member States, may undoubtedly facilitate the functioning of EMU. However, in assessing the role of fiscal policy one must take into account other shock-absorbers, which may be actually enhanced by EMU. For instance, better financial integration and the absence of exchange rate risk may favour a process of assets diversification, which may itself provide an automatic, market-driven shock-absorbing mechanism. One has also to consider the potential advantages of the constraints on fiscal policy. Actually, keeping low the weight of the European budget (and constraining the opportunities for free-riding behaviour on the part of national governments) is part of a stability-oriented macroeconomic framework. Moreover, limiting the role of the European level of government is consistent with a strategy to keep decisions and actions as close as possible to the actual problems and the relevant information flows.

This strategic argument in favour of the subsidiarity principle appears particularly well founded in the employment domain, given the prevailing structural nature of European unemployment and the diversity of the structural constraints present in the different countries. This paper provides a further reason why policy centralisation should be resisted when dealing with unemployment. It is based on an empirical investigation of the characteristics of regional unemployment in the EU. This suggests that some countries may suffer from "excessively" centralised labour markets in relation to their large interregional productivity differentials. Specifically, regulations decided at national level, often tailored to the conditions of the median region, may have created a wage floor in the less productive regions, turning them into high-unemployment regions. In other words, we suggest that an excessive degree of centralisation may already exist in current national settings. This leads to an important policy conclusion in the context of EMU. As differences across regions Europe-wide are greater than within any individual country, centralisation of labour market institutions at European level and especially wage equalisation should be in general be resisted. This argues, for instance, against the adoption of a "social snake" or "corridor model" for EU social policy, whereby individual social benefits or aggregate social expenditure in EU Member States would not be allowed to fall below certain income-related standards[29]. The perspective of the enlargement to the countries of Central and

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27 Taking into account of the degree of persistence, as the more persistent the shock, the less use there is for the exchange-rate as shock-absorber. The distribution of shocks is also likely to be affected by the integration of financial and productive environments.

28 In terms of both price and wage flexibility and cross-country mobility of workers and firms.

29 For details of the "social snake" and the "corridor model" for EU social policy see, respectively, Dispersyn and Van der Vost (1990) and Busch (1998).

Eastern Europe, where levels of development and social protection evolution differ substantially from those of the current Member States, further reinforces the argument against excessive social harmonisation[30].

Needless to say, there are other aspects that should be taken into account when discussing the "correct size" of the government, both at national and at European level. These include a range of ethical and political issues, which are ultimately encapsulated in the question of "who is us?" This paper does not touch such issues. Its only claim is that, whatever the constraints placed by the answer that is given to the question of national and European identity, social and employment policies should pay the greatest possible attention to the diversity of local conditions.

This conclusion is not invalidated by the well-known argument that a stronger co-ordination in unions' bargaining may positively affect macroeconomic performance[31]. In the European context of wide national differences in the strength and role of unions, the same argument can be used to highlight the dangers of less than complete co-ordination of bargaining under EMU conditions. Specifically, EMU might conceivably have divergent implications for unions' behaviour in Germany and in the other member countries. In the latter, elimination of the devaluation option might render more stringent the external discipline that was already indirectly supplied by the Bundesbank through the ERM. In Germany, by contrast, unions might feel to be less constrained under EMU conditions than in the previous framework, where the Bundesbank was more immediately concerned with their wage demands[32]. In principle, increased co-ordination of bargaining at supranational level might offer a remedy against the emergence of such a divergence. However, the extent of the differences across national industrial relations systems makes the task of efficient co-ordination extremely difficult. The alternative of moving towards more decentralisation might be therefore more appealing, particularly in the light of the increased importance, in the new EMU environment, of local/structural shocks, vis-à-vis macro/aggregate ones, which adds to the advantages of a more decentralised system. Whatever the relative merits of bargaining centralisation and decentralisation (an issue well beyond the aim of this paper), the conclusion that we wish to stress is that supra-national co-ordination should avoid a (premature) homogeneisation of wages and working conditions across countries that are (still) extremely differentiated.

Our diagnosis of regional unemployment as the result of excessive centralisation does not imply that the only policy recipe is that of flexibilisation of the employment regimes along regional lines. If low-productivity regions are disproportionally penalised by wage floors resulting from national institutions, regional policies focused on the least productive regions may have an important aggregate effect even on unemployment. Specifically, in the context of our model, productivity-enhancing measures that raise labour demand at any given level of wages, are particularly effective, in terms of employment, in the least productive regions, where the equilibrium unemployment tends to fall in the flat section of the wage curve, and hence gains in employment can be obtained with little pressure on wages. In other words, the regional dimension of unemployment in the EU (or at least in some EU countries) calls for a two-handed approach, enhancing both flexibility and productivity in the less favoured regions. Needless to say, stating that there is a potential role for well-designed regional policies does not imply that the regional policies so far conducted have been effective. Moreover, their effectiveness should be judged not only in terms of their impact on productivity , but also in the light of the need to avoid negative side-effects on wage flexibility. Assessing the existing policies is well beyond the aim of this paper. Here it suffices to say that the (difficult) task is that of designing policies which are cost-effective at the micro level and which, at the same time, have only limited spill-over effects on the reservation wages of the unemployed (for instance, avoiding to create long queues of job applicants to the subsidised firms). Such a combination might even require some form of "conditionality", so that the regional aid is made conditional upon budgetary and wage discipline.

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30 For a review of issues surrounding social harmonisation in relation to the enlargement to Central and Eastern Europe see Bean *et al.* (1998).

31 The classical formulation of this argument is found in Calmfors and Driffill (1988).

32 This is because the ECB would react to any German unions' 'misbehaviour' only to the extent that the average of the euro-area is going to be affected. The perception of such a lesser concern might induce German unions to put forward excessive wage claims. The risk would be less important for smaller countries, where the unions would feel too small to escape the discipline of increased competition in the euro-area. For related considerations on the interactions between the ECB and different national bargaining settings see Calmfors (1998) and Soskice and Iverson (1998).

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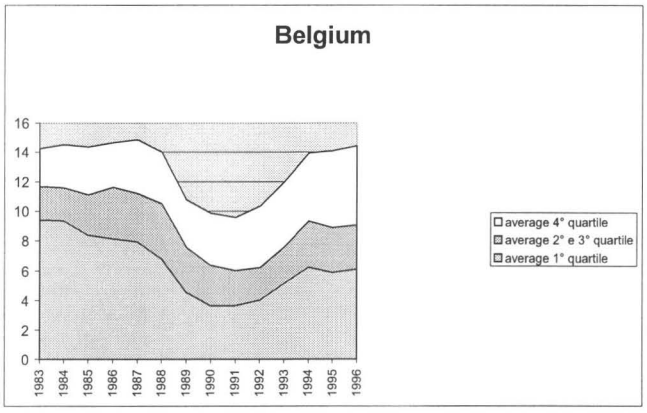
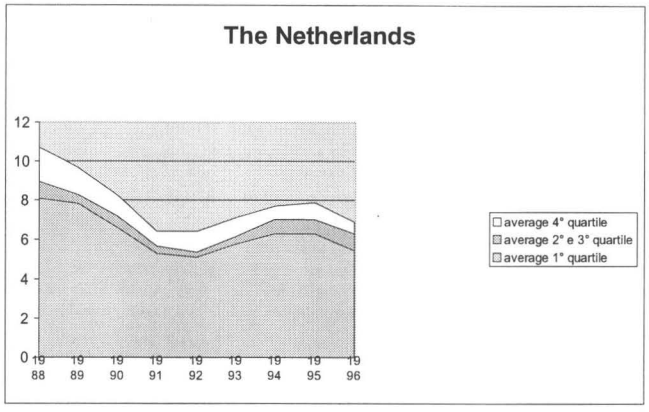
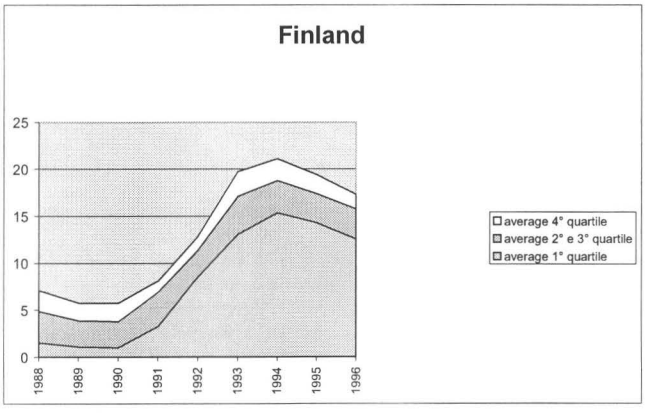
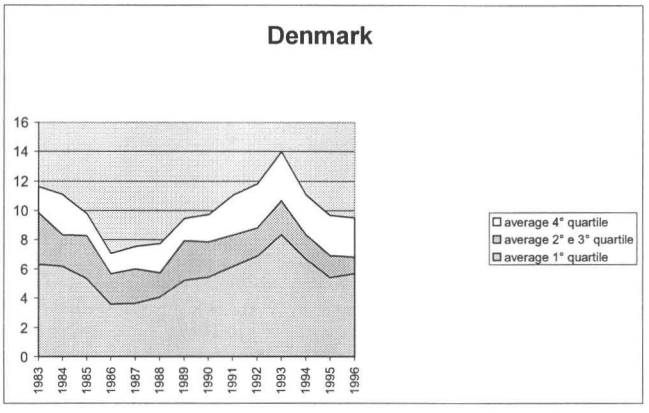
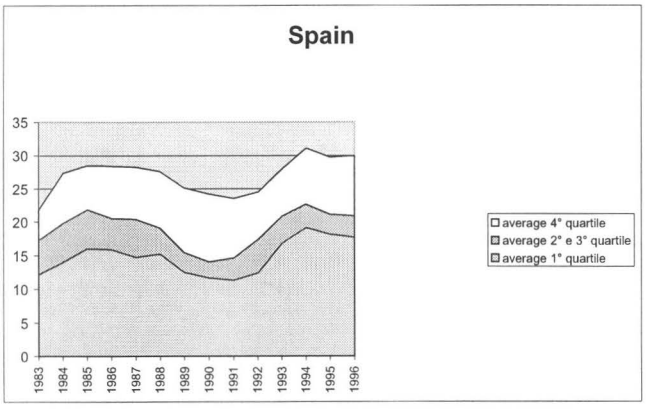
Graph 1 : Regional unemployment: evolution over time

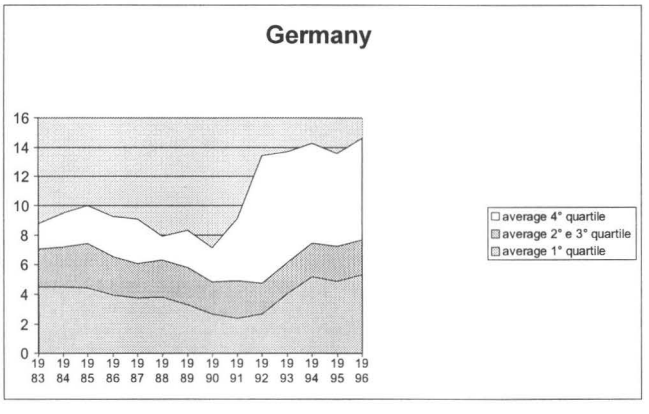


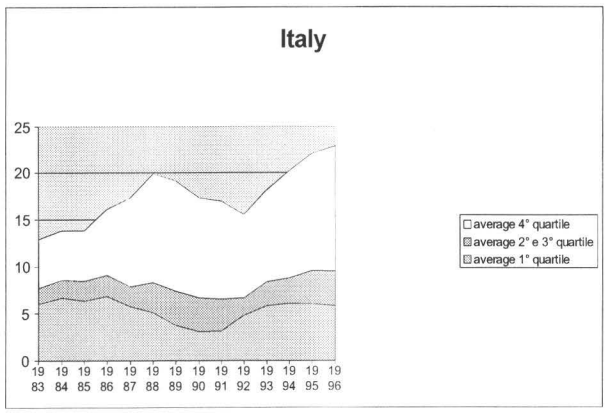








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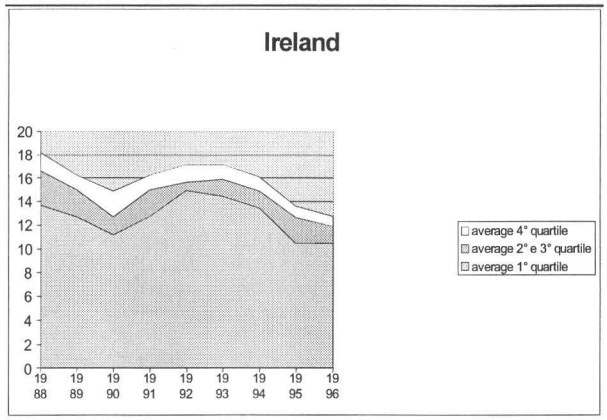
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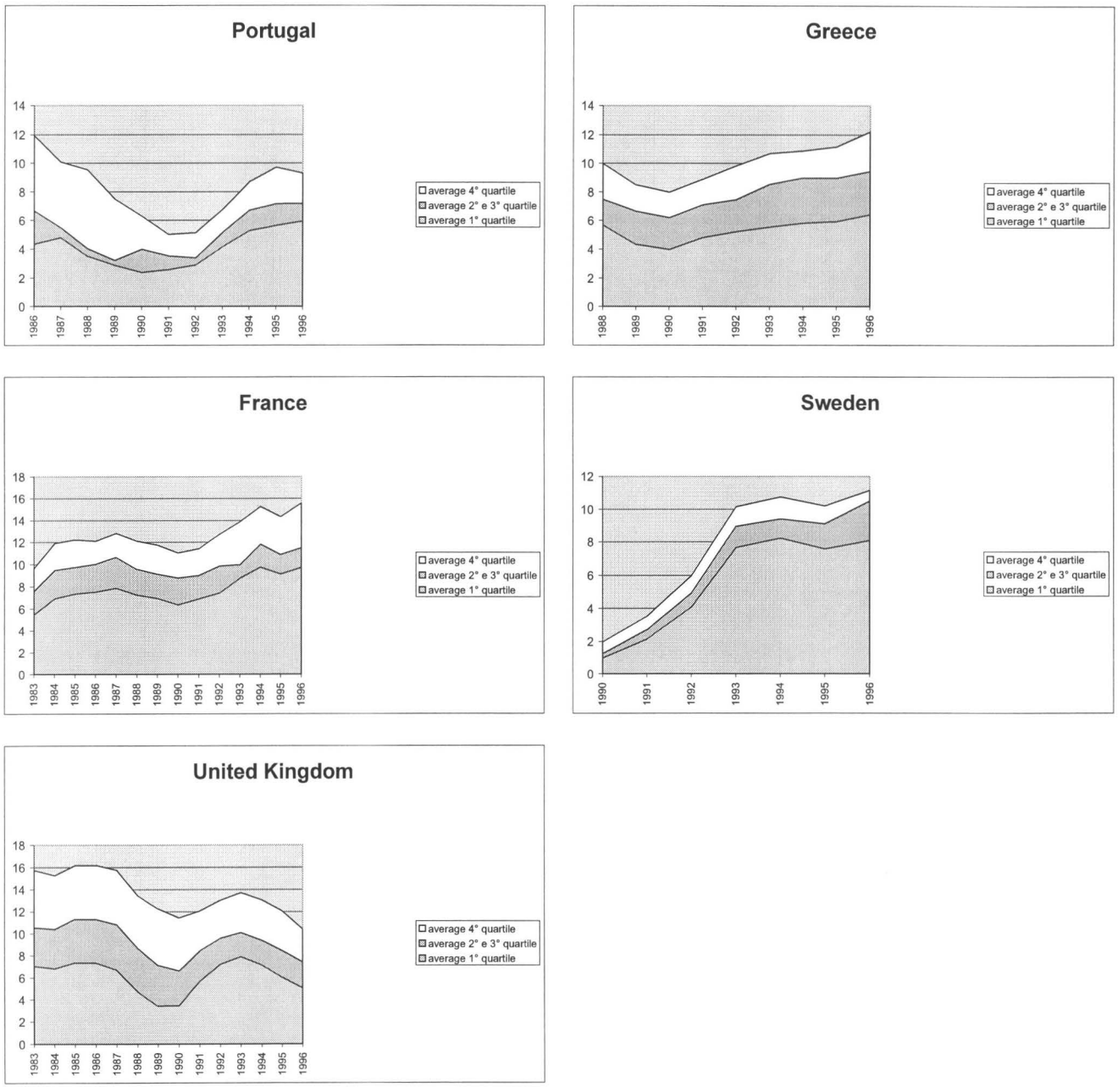
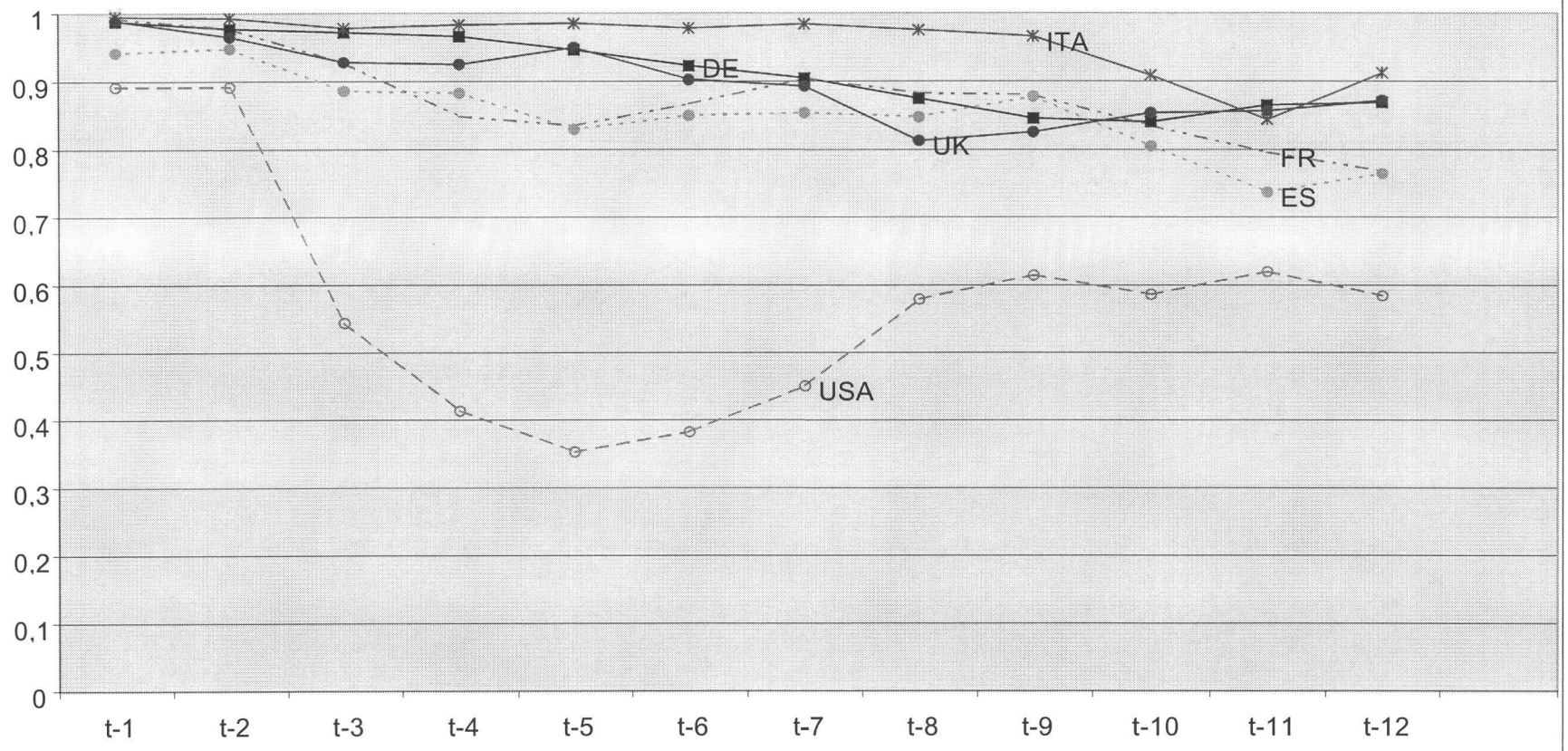
Graph 1: Regional unemployment: evolution over time



Source: Authors elaboration on Eurostat data (CRONOS database)

Graph 2: Regional unemployment: autocorrelation over time[1]



(1) Correlation between regional unemployment rates in year t and previous years.
Year t is 1996 for all countries except USA for which it is 1991.

Source: Authors elaboration on Eurostat data (CRONOS database)

Table 1: Regional unemployment: autocorrelation over time

Countries	Average t/t-1 correlation in 1984-1996	Average t/t-1 correlation in 1988-1996[33]	1992-1996 correlation	1988-1992 correlation	1984-1988 correlation	1984-1996 correlation
Belgium	.984	.994	.989	.991	.848	.717
Denmark	.968	.969	.927	.984	.975	.771
Greece	n.a.	.840	.665		n.a.	n.a.
France	.974	.974	.849	.977	.884	.768
Italy	.965	.984	.983	.982	.895	.912
Spain		.947	.883	.942	.897	
Portugal	n.a.	.961	.845	.966	n.a.	n.a.
Netherlands	n.a.	.841	.869		n.a.	n.a.
Ireland	n.a.	.398	.399	n.a.	n.a.	n.a.
Germany	n.a.	.979	.966	n.a.	n.a.	n.a.
Germany (W)	.989	.989	.966	.990	.934	.869
Sweden	n.a.	.949	.906	n.a.	n.a.	n.a.
Austria	n.a.	.976	n.a.	n.a.	n.a.	n.a.
United Kingdom	.984	.978	.925	.995	.954	.872

Source: Authors elaboration on Eurostat data (CRONOS database)

33 1991-96 for Germany; 1993-96 for Austria.

Table 2: Regional unemployment: variance decomposition[34]

Countries	Dispersion Among the regional dummies coefficients	Share of variance explained by regional dummies	Properties of the statistical model	
			Total adj. R2	Sample period
Belgium	.1437	.191	.887	83-97
Denmark	.0847	.209	.810	83-97
Greece	.1469	.081	.352	88-97
France	.0210	.001	.787	83-97
Italy	.2224	.197	.925	83-90
Spain	.1136	.106	.861	83-90
Portugal	.1764	.179	.833	86-97
Netherlands	.0692	.107	.746	88-97
Ireland	.06163	.052	.338	88-97
Germany	.1788	.557	.834	91-97[2]
Germany (West)	.1559 .1445	.495 .421	.801 .782	83-90 83-97[2]
Sweden	.0713	.063	.930	93-97
Austria	.1075	.226	.899	94-97
United Kingdom	.1310	.319	.810	83-97

Source: Authors elaboration on Eurostat data (CRONOS database)

34 The table reports the results of an analysis of variance exercise where the log of the unemployment rate for each age group (people younger or older than 25 years of age), sex, region and year – within each country – has been regressed on a full set of yearly, age-group, sex and region dummies. The first column reports the standard deviation of the estimated coefficients of the latter. The second column reports the change in the adjusted R3 obtained including those region dummies (in a model where all the other effects are already present). The third and fourth columns respectively report the adjusted R2 of the complete model and the sample period utilised in the estimates.

2 Excluding 1995 and 1996.

Diagram 1: Regional labour markets without wage floors

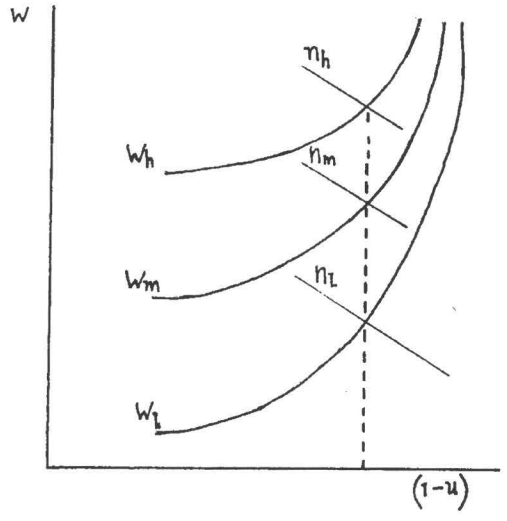


Diagram 2: Regional labour markets with wage floors

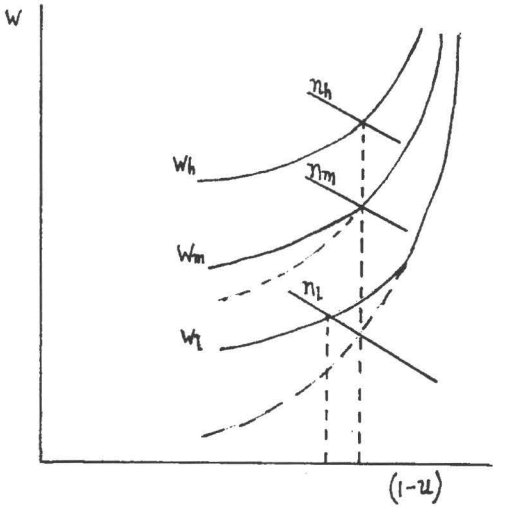
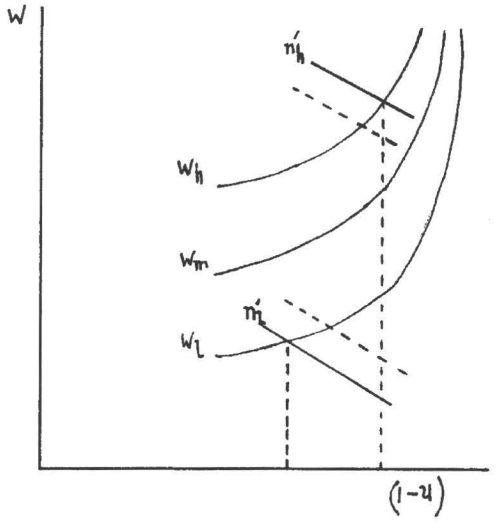
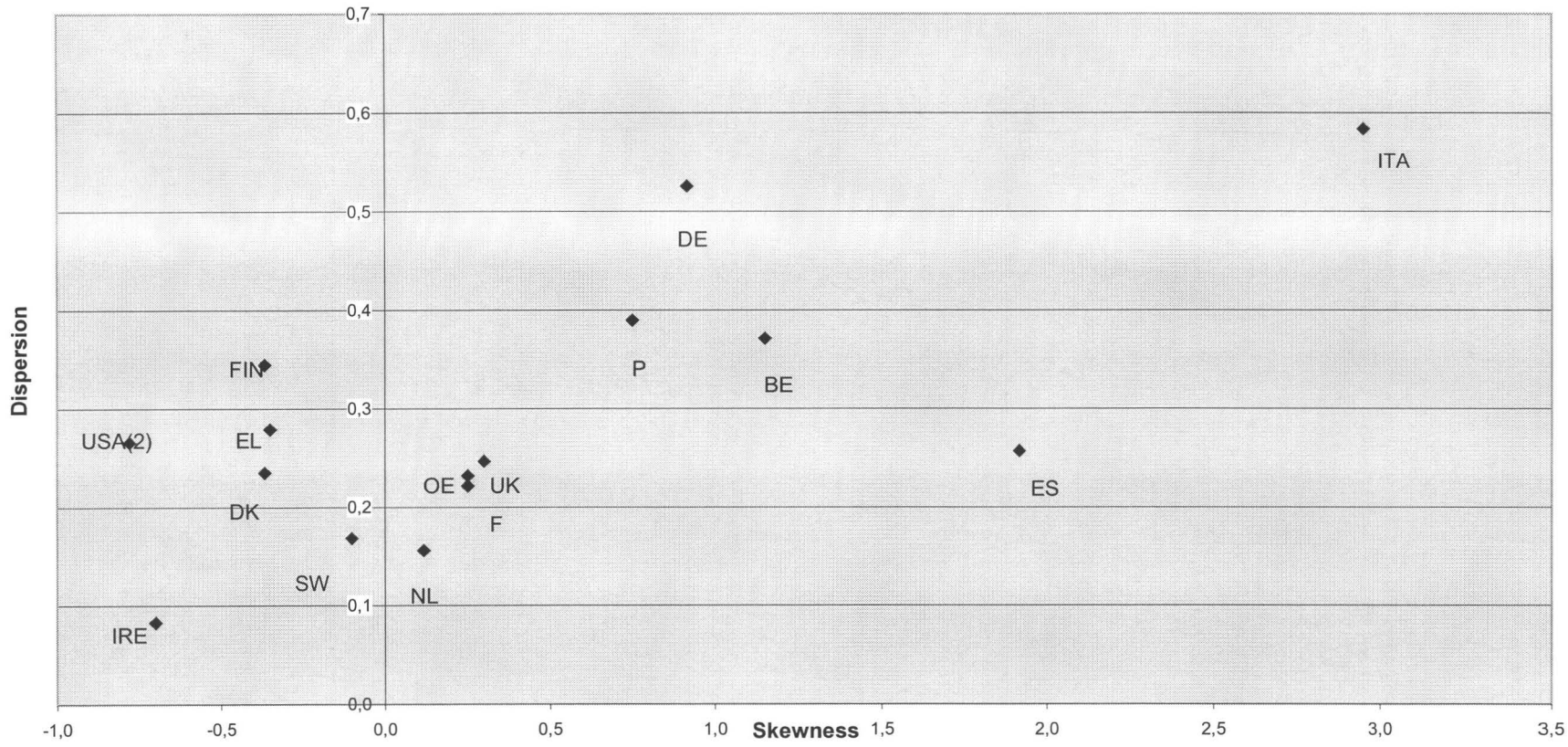


Diagram 3: Regional labour markets with wage floors and inequality increasing demand shock.



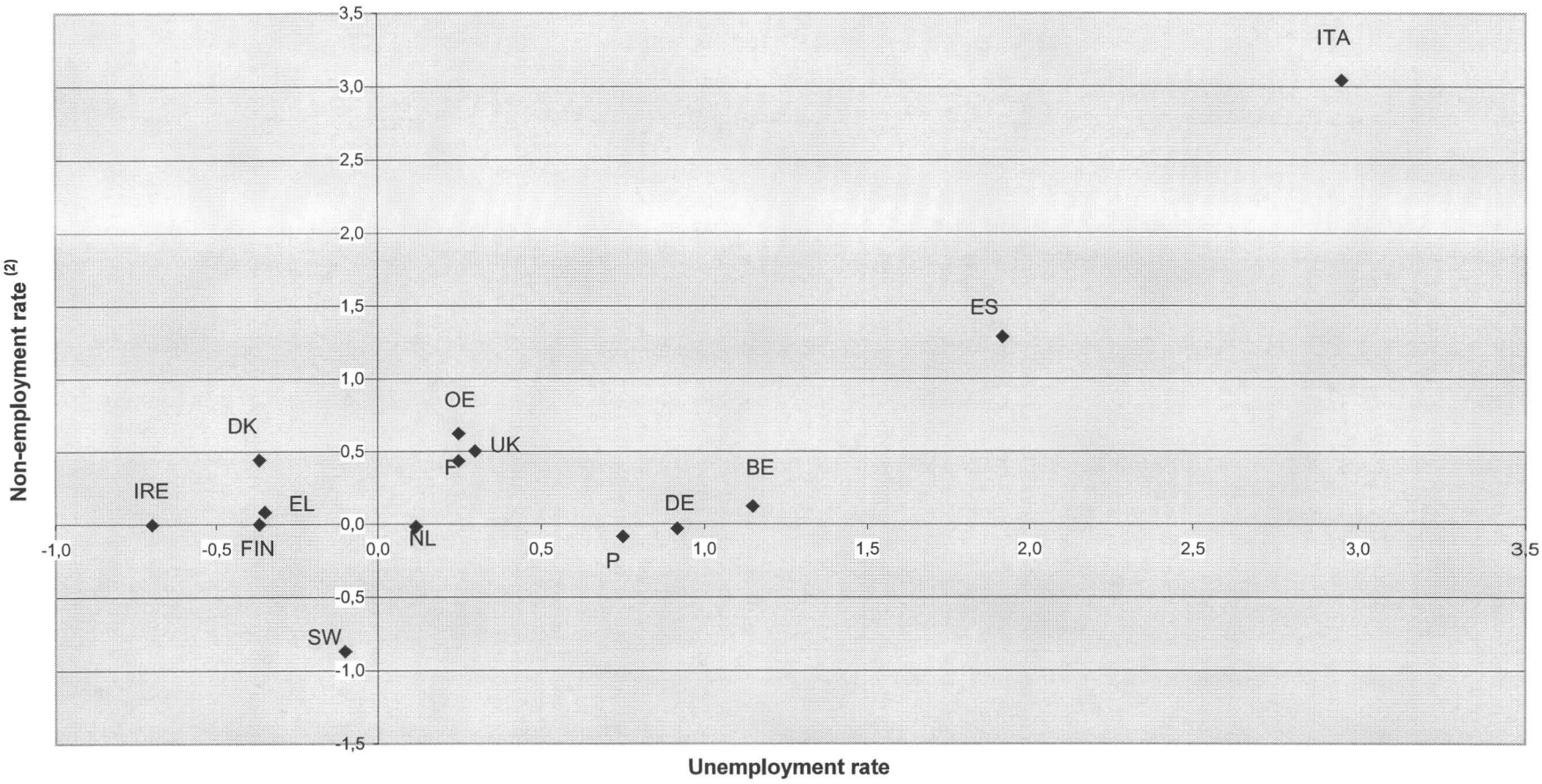
Graph 3: Regional unemployment: skewness and dispersion [1] (1991-1996)



(1) Skewness is defined as the difference between the mean and the median; the dispersion is the coefficient of variation.
(2) 1980-1991.

Source: Authors elaboration on Eurostat data (CRONOS database)

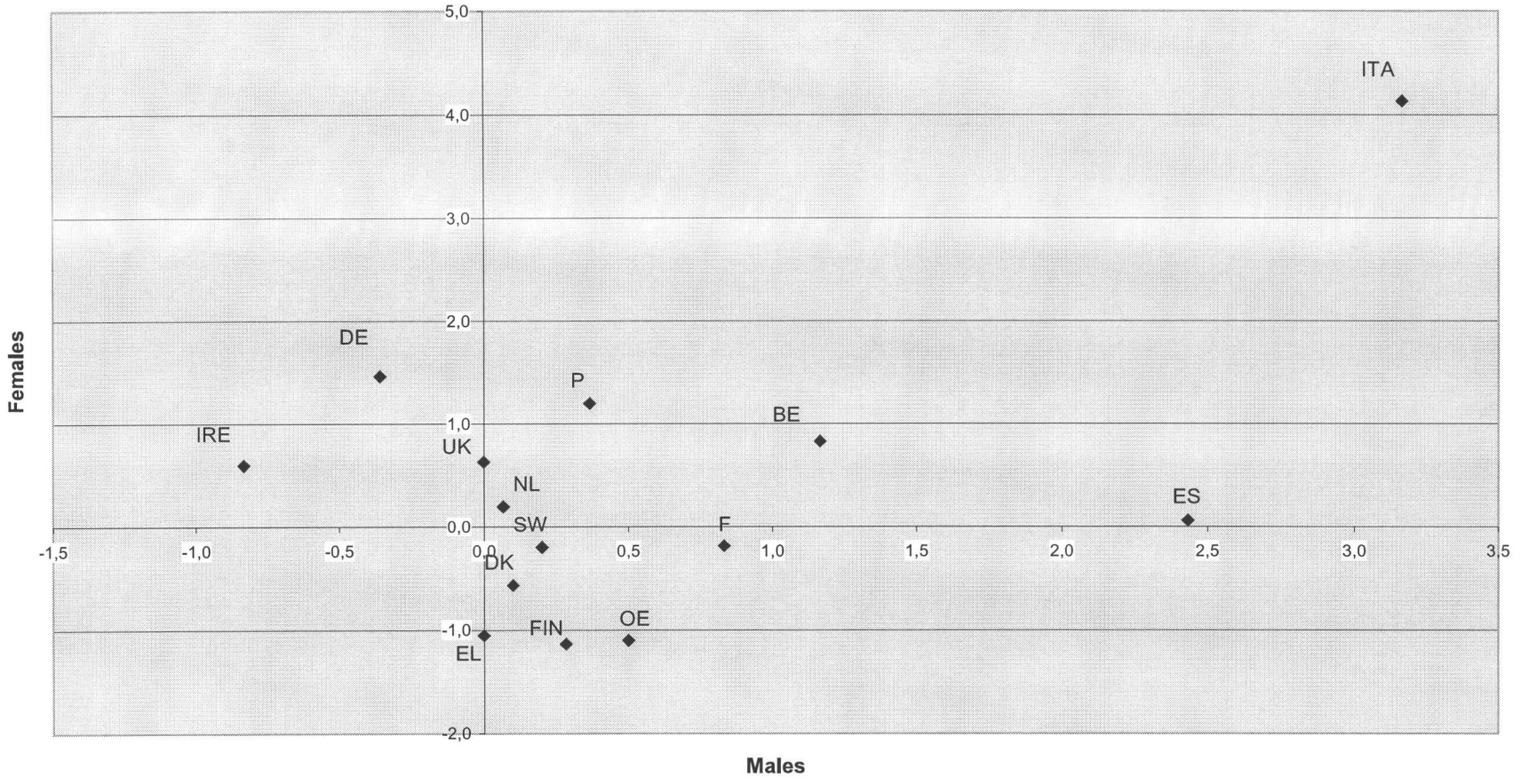
Graph 4: Regional unemployment and non-employment: skewness [1] (1991-1996)



(1) Skewness is defined as the difference between the mean and the median.
(2) The employment rate is the ratio of the employed to the working age (14-65) population. The non-employment rate equals one minus the employment rate.

Source: Authors elaboration on Eurostat data (CRONOS database)

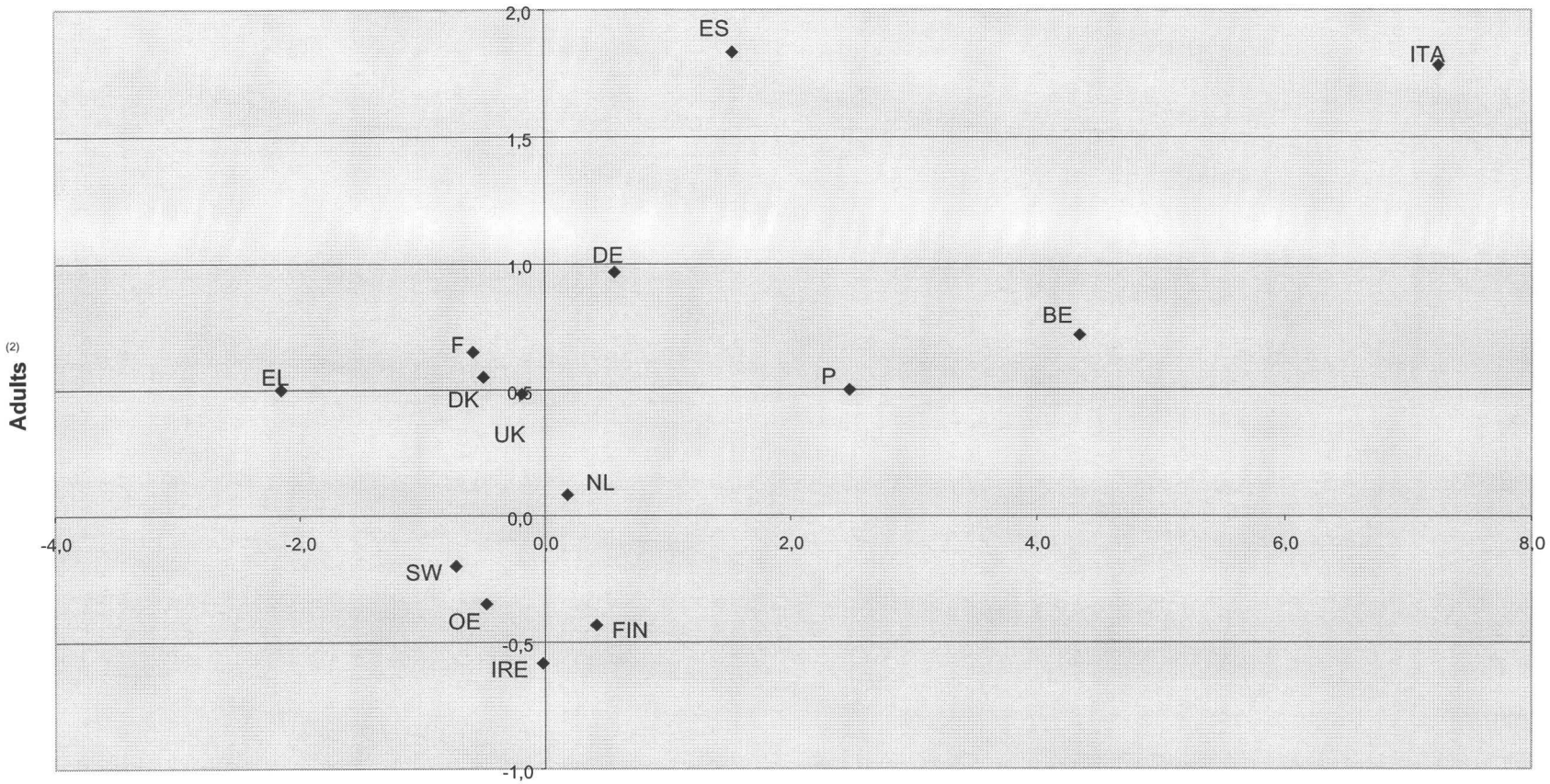
Graph 5: Regional unemployment by sex: skewness [1] (1991-1996)



(1) Skewness is defined as the difference between the mean and the median.

Source: Authors elaboration on Eurostat data (CRONOS database)

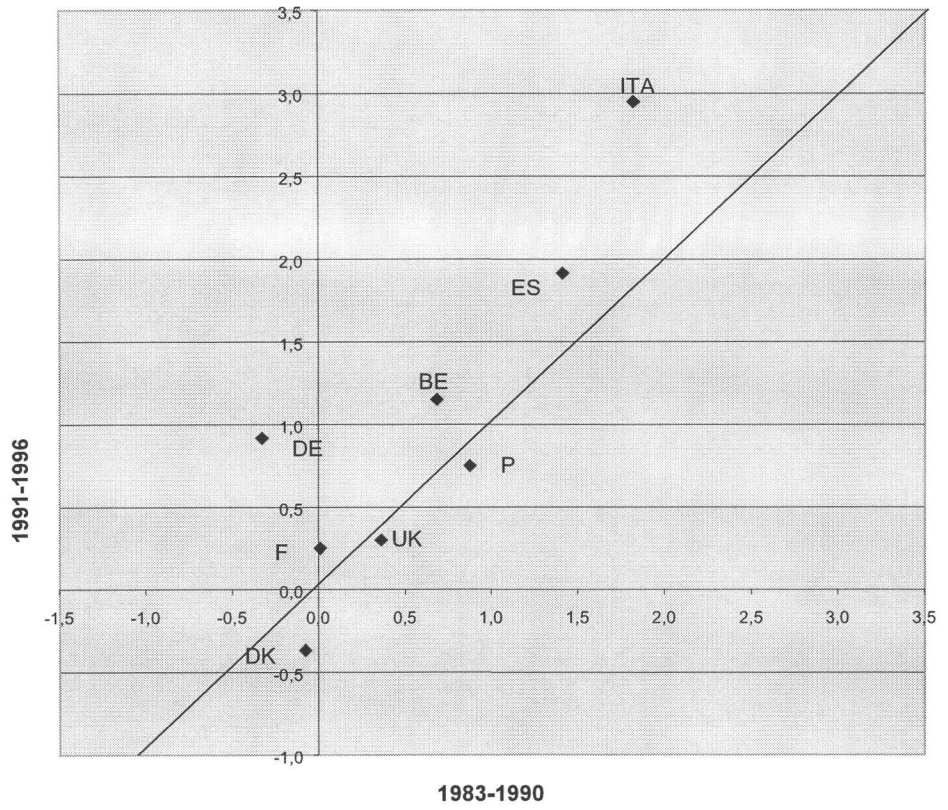
Graph 6: Regional unemployment by age: skewness [1] (1991-1996)



(1) Skewness is defined as the difference between the mean and the median.
(2) Young: less than 25 years of age. Adult: 25 years of age and over.

Source: Authors elaboration on Eurostat data (CRONOS database)

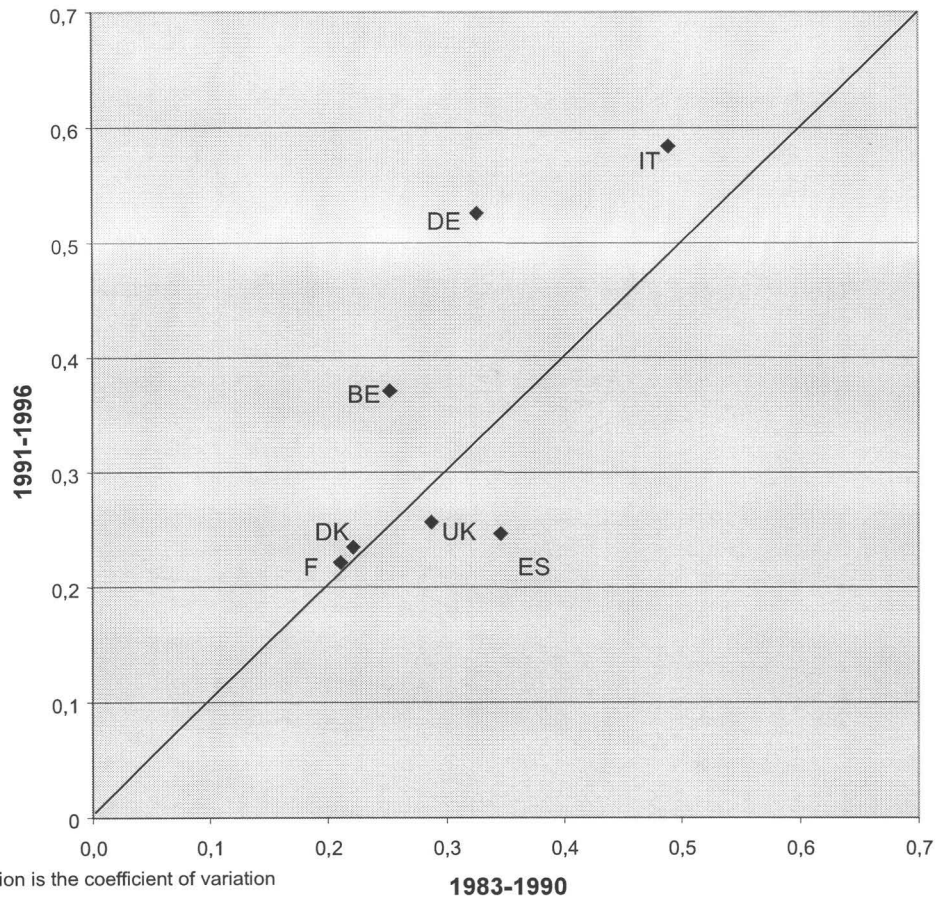
Graph 7: Regional unemployment: skewness (1) (1983-1990, 1991-1996 periods)



(1) the skewness is the difference between the mean and the median

Source: Authors elaboration on Eurostat data (CRONOS database)

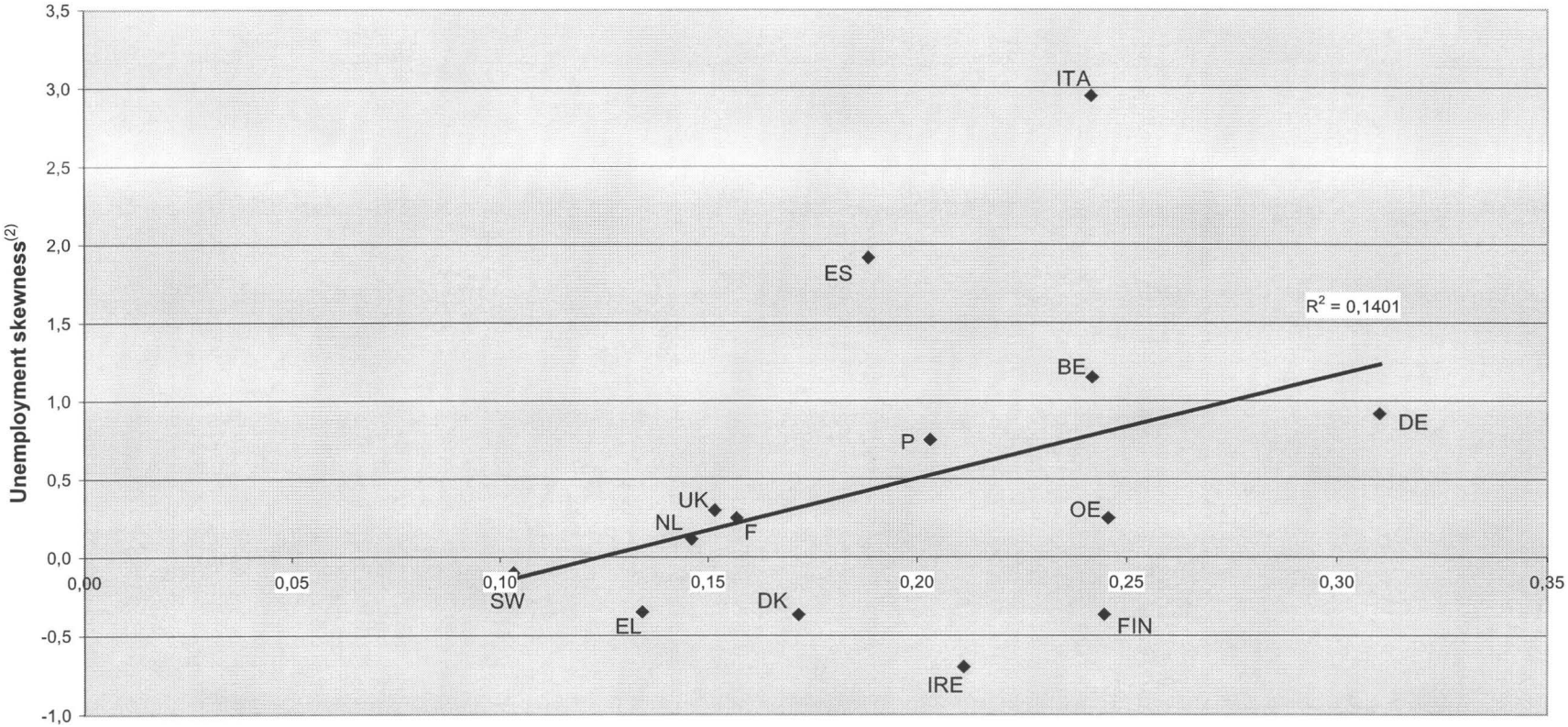
Graph 8: Regional unemployment: dispersion (1) (1983-1990,1991-1996 periods)



(1) The dispersion is the coefficient of variation

Source: Authors elaboration on Eurostat data (CRONOS database)

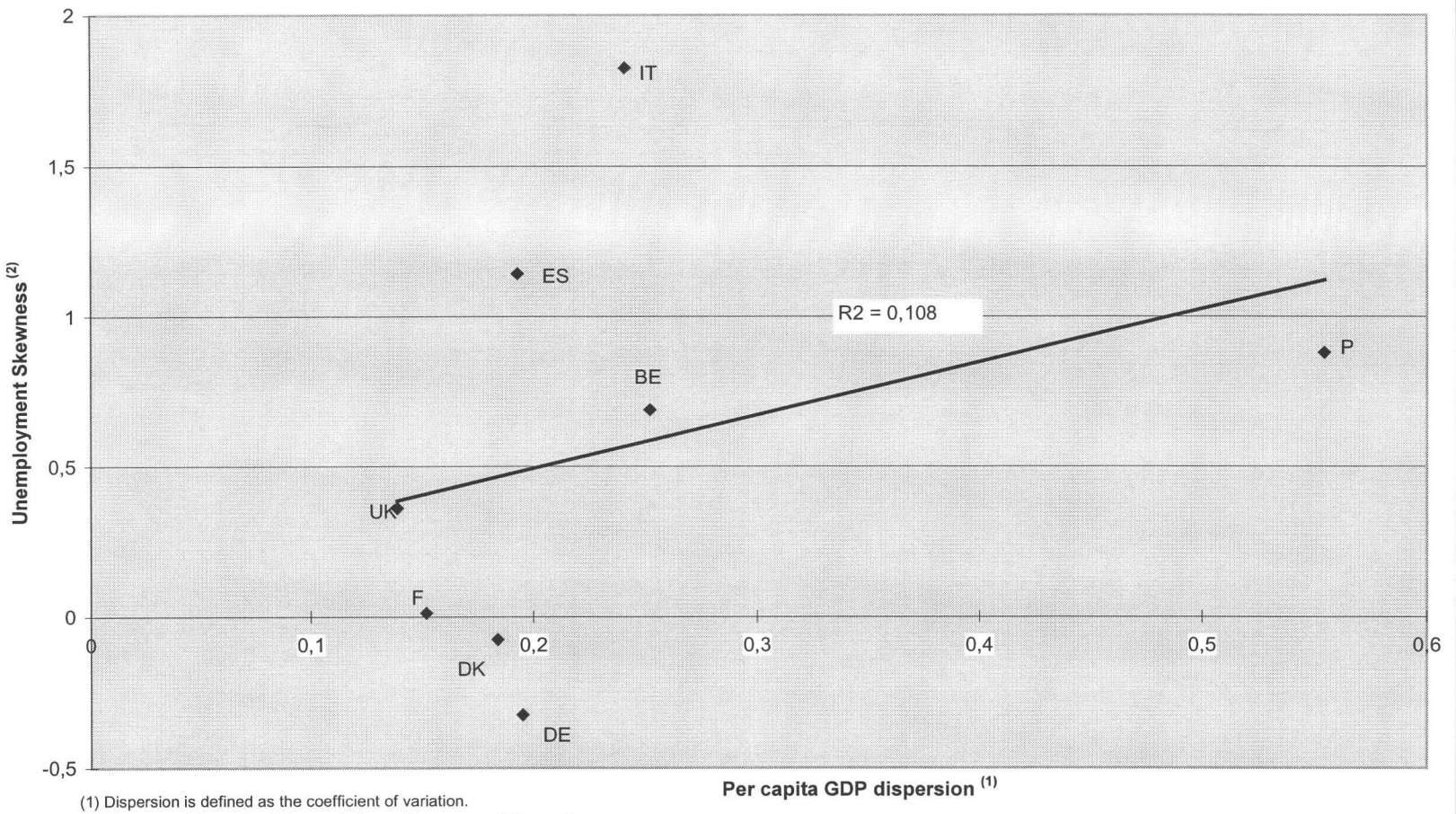
Graph 9: Regional unemployment and GDP per capita: skewness and dispersion (1990s)



(1) Dispersion is defined as the coefficient of variation.
(2) Skewness defines the difference between the mean and the median.

Source: Authors elaboration on Eurostat data (CRONOS database)

Graph 10: Regional Unemployment and GDP per capita: skewness and dispersion (1980s)



(1) Dispersion is defined as the coefficient of variation.
(2) Skewness defines the difference between the mean and the median.

Source: Authors elaboration on Eurostat data (CRONOS database)

Table 3 : Regional productivity regressed against regional unemployment[35]

Country	Coefficient	Intercept	Adj. R^2
Belgium	0.0079 (0.0935)	7.9338 (1.9594)	-0.1100
Excl. Brussels	-0.2360 (-1.7044)	18.1257 (3.0150)*	0.1747
Denmark	0.0714 (1.561156)	5.5306 (2.8284)*	0.0931
Excl. Copenhagen	0.2038 (1.742861)	0.7243 (0.1623)	0.1451
Germany	-0.1391 (-3.0387)*	13.4247 (6.7138)*	0.1780
Excl. Berlin	-0.1505 (-3.2107)*	14.0926 (6.8299)*	0.2054
Greece	-0.0845 (-0.3781)	8.9634 (1.9195)	-0.0769
Excl. Athens	-0.0612 (-0.2919)	8.8777 (2.0089)	-0.0907
Spain	0.0598 (0.2057)	17.9294 (1.7413)	-0.0597
Excl. Madrid	0.2009 (0.6536)	13.3914 (1.2453)	-0.0371
France	0.0137 (0.1408)	10.8821 (2.5001)*	-0.0466
Excl. Paris (idf)	0.1957 (1.3837)	3.0655 (0.4956)	0.0417
Excl. Corsica	-0.1045 (-1.1342)	15.8302 (3.8854)*	0.0134
Excl. Corsica and Paris (idf)	-0.0921 (-0.5013)	15.2995 (-0.0388)	-0.0388
Ireland	0.0856 (1.2674)	11.0791 (5.0753)	0.0797
Excl. Dublin	0.3839 (0.3783)	12.4333 (4.0161)*	-0.1665
Italy	-0.6678 (-3.6434)*	38.6522 (4.9813)*	0.4054
Excl. Rome (Latium)	-0.7044 (-3.6727)*	39.9813 (4.9657)*	0.4235
Netherlands	-0.0078 (-0.1602)	6.8697 (3.5883)*	-0.0971
Austria	0.0114 (0.3147)	3.5635 (2.3027)	-0.1269
Excl. Vienna	0.0690 (0.9486)	1.3939 (0.4915)	-0.0144
Portugal	0.0119 (0.0350)	5.7025 (1.1164)	-0.1997
Excl. Lisbon	0.0748 (0.1262)	4.8653 (0.5853)	-0.2450
Finland	-0.1823 (-0.4024)	20.8210 (1.1165)	-0.2013
United Kingdom	0.0913 (0.9308)	5.9521 (1.9872)	-0.0037
Excl. London	0.1991 (1.4238)	2.7849 (0.6649)	0.0285
Sweden	-0.0430 (-0.2298)	9.8270 (1.2132)	-0.1564
Excl. Stockholm	0.5097 (2.6580)*	-13.3609 (-1.6443)	0.5026
EU (countries)	-0.0905 (-0.8361)	12.8564 (2.8986)*	-0.0219
EU excl. Lux	0.0099 (0.0760)	9.3887 (1.8472)	-0.0828

[35] OLS estimate on 1991-1996 averages. T-statistics in parenthesis (an asterisk indicates the result is significant at the 5% level).

Source: Authors elaboration on Eurostat data (CRONOS database)

Table 4: Indicators of centralisation of labour market institutions

	Centralisation of bargaining institutions				Minimum wage relative to median low wage (1997)	Means tested UB expenditure (% of UB expenditure)	Share of public sector employment on total employment		Share of public sector employment on working age population
	Bargaining coverage		Centralisation				Mid '90s	Early '80s	Mid '90s
	Mid '90s	Early '80s	Mid '90s	Early '80s					
Austria	98	98	2	2		18.75	2.9	19.0	14.0
Belgium	90	90	2	2	83.9	0	19.1	20.1	10.6
Denmark	69	69	2	3		0	31.0	30.1	22.2
Finland	95	95	2	3		14.94	24.7	19.5	14.6
France	95	85	2	2	35.2	6.49	24.1	22.0	14.3
Germany (W)	92	91	2	2		13.25	15.8	15.3	10.1
Greece	-	-	-	-			10.0	9.0	5.4
Ireland	-	-	2	2		7.2	17.2	17.8	9.3
Italy	82	85	2.5	1.5		0	15.9	15.0	9.2
Netherlands	81	76	2	2	83.1	40.66	13.6	15.7	7.0
Portugal	71	70	2	2		20.69	17.7	12.5	11.4
Spain	78	76	2	2	66.6	25.69	14.6	11.0	6.7
Sweden	89	86	2	3		0	31.8	32.2	23.8
UK	47	70	1	2		47.22	16.7	21.9	11.3

Source: Elaboration of the authors on various sources.

7. Statistical Appendix

All the figures used in the calculations are from Eurostat and the time period covered depends on the availability of updated data.

The regions in the panel were chosen mainly according to the following basic principles:
- availability of figures at NUTS3 level;
- relative homogeneity of size in terms of population;
- respect of administrative borders within the countries.

For the purposes of our calculation we considered the following regions:

Country	Regions
Belgium	NUTS2 except for Reg. Bruxelles-Cap for which we used NUTS1
Denmark	NUTS3
Germany	NUTS2 except for Brandeburg, Bremen, Hamburg, Mecklenburg-Vorpommern, Sachsesn, Thueringen, Saarland, Schleswig-Holstein for which we used NUTS1 and for Berlin for which we have used NUTS3
Greece	NUTS2 except for Attiki for which we used NUTS1
Spain	NUTS2 except for Madrid and Canarias for which we used NUTS1
France	NUTS2 except for Ile-de-France and Nord-Pas-De-Calais for which we used NUTS3
Ireland	NUTS3
Italy	NUTS2 except for Lombardia, Emilia-Romagna Lazio, Abruzzo-Molise Campania, Sicilia and Sardegna for which we used NUTS1
The Netherlands	NUTS2
Austria	NUTS2
Portugal	NUTS2 except for Açores and Madeira for which we used NUTS1
Finland	NUTS2 except for Ahvenanmaa/Aaland for which we have used NUTS1
Sweden	NUTS2
United Kingdom	NUTS2 except for East Anglia for which we used NUTS3 and for Northern Ireland for which we used NUTS1

As for unemployment rates in the '90s the basic principle was to interpolate missing data according to the behaviour of the variable in the preceding years. As for the '80s instead (since missing data are much more frequent) the time period covered in calculations is shorter whenever figures for at least one region were not available; in particular we considered these time periods for the following countries:

Countries	Time period used in unemployment calculations (80s)
Greece	1988-1990
Ireland	1988-1990
The Netherlands	1988-1990
Portugal	1986-1990

Moreover for Germany the calculations refer to unified Germany for the '90s and to West Germany only for the '80s.

As for employment rates, figures on active population (15-64) were not available at NUTS3 level; so we used estimates built on the basis of the ratio between active and total population of the corresponding region at NUTS2 level.

As for productivity in the '90s (per capita GDP and GDP per worker) the dispersion indicator is the weighted coefficient of variation and the time period is shorter (1991-1994) because more updated figures were not available.

In the case of France we used aggregate figures for the regions Ile-de-France and Nord-pas-de-Calais and for Ireland the time period is 1991-1993.

As for the '80s the time period is shorter in many cases: Denmark (1988-1990), The Netherlands (1986-1990), Austria (1988-1990), Sweden (1985-1990) and United Kingdom (1987-1990).

8. List of regions

BELGIQUE-BELGIE

REG. BRUXELLES-CAP,
BRUSSELS HFDST. GEW,
ANTWERPEN
LIMBURG (B)
OOST-VLAANDEREN
VLAAMS BRABANT
WEST-VLAANDEREN
BRABANT WALLON
HAINAUT
LIEGE
LUXEMBOURG (B)
NAMUR

DANMARK

KOEBENHAVN OG FREDERIKS,KOM
KOEBENHAVNS AMT
FREDERIKSBORG AMT
ROSKILDE AMT
VESTSJAELLANDS AMT
STORSTROEMS AMT
BORNHOLMS AMT
FYNS AMT
SOENDERJYLLANDS AMT
RIBE AMT
VEJLE AMT
RINGKOEBING AMT
AARHUS AMT
VIBORG AMT
NORDJYLLANDS AMT

DEUTSCHLAND

STUTTGART
KARLSRUHE
FREIBURG
TUEBINGEN
OBERBAYERN
NIEDERBAYERN
OBERPFALZ
OBERFRANKEN
MITTELFRANKEN
UNTERFRANKEN
SCHWABEN
BERLIN-WEST, STADT
BERLIN-OST, STADT
BRANDENBURG
BREMEN
HAMBURG
DARMSTADT
GIESSEN
KASSEL
MECKLENBURG-VORPOMMERN
BRAUNSCHWEIG
HANNOVER
LUENEBURG
WESER-EMS
DUESSELDORF
KOELN
MUENSTER
DETMOLD
ARNSBERG
KOBLENZ
TRIER
RHEINHESSEN-PFALZ
SAARLAND
SACHSEN
DESSAU
HALLE
MAGDEBURG
SCHLESWIG-HOLSTEIN
THUERINGEN

ELLADA

ANATOLIKI MAKEDONIA,
THRAKI
KENTRIKI MAKEDONIA
DYTIKI MAKEDONIA
THESSALIA

ESPANA

GALICIA
ASTURIAS
CANTABRIA
PAIS VASCO

FRANCE

PARIS
SEINE-ET-MARNE
YVELINES
ESSONNE

IPEIROS
IONIA NISIA
DYTIKI ELLADA
STEREA ELLADA
PELOPONNISOS
ATTIKI
VOREIO AIGAIO
NOTIO AIGAIO
KRITI

NAVARRA
RIOJA
ARAGON
MADRID
CASTILLA-LEON
CASTILLA-LA MANCHA
EXTREMADURA
CATALUNA
COMUNIDAD VALENCIANA
BALEARES
ANDALUCIA
MURCIA
CEUTA Y MELILLA
CANARIAS

HAUTS-DE-SEINE
SEINE-SAINT-DENIS
VAL-DE-MARNE
VAL-D'OISE
CHAMPAGNE-ARDENNE
PICARDIE
HAUTE-NORMANDIE
CENTRE
BASSE-NORMANDIE
BOURGOGNE
NORD
PAS-DE-CALAIS
LORRAINE
ALSACE
FRANCHE-COMTE
PAYS DE LA LOIRE
BRETAGNE
POITOU-CHARENTES
AQUITAINE
MIDI-PYRENEES
LIMOUSIN
RHONE-ALPES
AUVERGNE
LANGUEDOC-ROUSSILLON
PROVENCE-ALPES-COTE
D'AZUR
CORSE

IRELAND

BORDER
DUBLIN
MID-EAST
MIDLAND
MID-WEST
SOUTH-EAST (IRL)
SOUTH-WEST (IRL)
WEST

ITALIA

PIEMONTE
VALLE D'AOSTA
LIGURIA
LOMBARDIA
TRENTINO-ALTO ADIGE
FRIULI-VENEZIA GIULIA
VENETO
EMILIA-ROMAGNA
TOSCANA
UMBRIA
MARCHE
LAZIO
ABRUZZO-MOLISE

CAMPANIA
PUGLIA
BASILICATA
CALABRIA
SICILIA
SARDEGNA

NEDERLAND

GRONINGEN
FRIESLAND
DRENTHE
OVERIJSSEL
GELDERLAND
FLEVOLAND
UTRECHT
NOORD-HOLLAND
ZUID-HOLLAND
ZEELAND
NOORD-BRABANT
LIMBURG (NL)

OESTERREICH

BURGENLAND
NIEDEROESTERREICH
WIEN
KAERNTEN
STEIERMARK
OBEROESTERREICH
SALZBURG
TIROL
VORARLBERG

PORTUGAL

NORTE
CENTRO (P)
LISBOA E VALE DO TEJO
ALENTEJO
ALGARVE
ACORES
MADEIRA

SUOMI/FINLAND

ETELAE-SUOMI
ITAE-SUOMI
VAELI-SUOMI
POHJOIS-SUOMI
AHVENANMAA / AALAND

SVERIGE

STOCKHOLM
OESTRA MELLANSVERIGE
SMAALAND MED OEARNA
SYDSVERIGE
VAESTSVERIGE
NORRA MELLANSVERIGE
MELLERST
OEVRE NORRLAND

UNITED KINGDOM

CLEVELAND, DURHAM
CUMBRIA
NORTHUMBERLAND, TYNE AND WEAR
HUMBERSIDE
NORTH YORKSHIRE
SOUTH YORKSHIRE
WEST YORKSHIRE
DERBYSHIRE
LEICS, NORTHAMPTONSHIRE
LINCOLNSHIRE
CAMBRIDGESHIRE
NORFOLK
SUFFOLK
BEDFORDSHIRE; HERTFORDSHIRE
BERKS,, BUCKS,, OXFORDSHIRE
SURREY, EAST-WEST SUSSEX
ESSEX
GREATER LONDON
HAMPSHIRE, ISLE OF WIGHT
KENT
AVON, GLOUCS, WILTSHIRE
CORNWALL, DEVON
DORSET, SOMERSET
HEREFORD WORCS,
WARWICKS,
SHROPSHIRE
STAFFORDSHIRE
WEST MILAND (COUNTY)
CHESHIRE
GREATER MANCHESTER
LANCASHIRE
MERSEYSIDE
CLWYD, DYFED, GWYNEDD, POWYS
GWENT, MID-S-W
GLAMORGAN
BORD,-CENTR,-FIFE-LOTH,-TAY,
DUMFR,-GALLOWAY, STRATHCLYDE
HIGHLANDS, ISLANDS
GRAMPIAN
NORTHERN IRELAND